

Sawyer Avenue Bridge
Spanning Black River on Sawyer Avenue
Hammel Vicinity
Taylor County
Wisconsin

HAER No. WI-99

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WIS
60. HAM. V.
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PHOTOGRAPHS

WRITTEN HISTORICAL AND DESCRIPTIVE DATA

Historic American Engineering Record
National Park Service
Great Lakes System Office
1709 Jackson Street
Omaha, Nebraska 68102-2571

HISTORIC AMERICAN ENGINEERING RECORD

SAWYER AVENUE BRIDGE

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Location: Sawyer Avenue over the Black River
Hammel Vicinity, Taylor County, Wisconsin

USGS Perkinstown Quadrangle, Universal Transverse Mercator Coordinates:
Zone 15 Easting 692465 Northing 5001890

Present Owner: Town of Hammel

Present Use: Vehicular bridge

Significance: The Sawyer Avenue Bridge is a single-lane, two-span Pratt Standard pony truss that was erected in 1905-1906 by the Hennepin Bridge Company of Minneapolis. Although not specifically identified in *Cultural Resource Management in Wisconsin* (the state's cultural resource management plan), it is a Pratt Standard pony truss bridge that compares favorably to the Ten Eyck Road Bridge, a structure identified in the management plan (see HAER No. WI-94). As well, *Cultural Resource Management* identifies the Hennepin Bridge Company as a prolific bridge builder in the state.¹ With its integrity largely intact, the Sawyer Avenue Bridge is significant as a good example of an early twentieth-century, Pratt Standard pony truss that was built by a prominent regional bridge-building company.

PART I. HISTORICAL INFORMATION

A. Physical History:

1. Date of erection: 1905-1906.²
2. Architect: Unknown.
3. Original and subsequent owners: Public ownership.

¹Barbara Wyatt, ed., *Cultural Resource Management in Wisconsin*, Vol. 2 (Madison: State Historical Society of Wisconsin, Historic Preservation Division, 1986), Transportation, 12/9, 12/23.

²Taylor County, *Record of Proceedings*, Vol. D, pp. 513-15, 519-21, 560, 562-64. Records on file at the County Clerk Office, Taylor County Courthouse, Medford, WI.

4. Builder: Hennepin Bridge Company.³
5. Alterations and additions: The historical integrity of this bridge is generally good, although a few members have been replaced. Specifically, the northern hip vertical at the east end of the structure has been replaced, while one of the two diagonals associated with that vertical's top chord connection is loose.

B. Historical Context:

COUNTY & LOCAL AREA HISTORY

Taylor County was organized in 1875, a time in which the lumber industry was the dominant economic activity throughout the region. Well-suited to those who were harvesting the state's timber supplies, the county was said to have "no large rivers...but it is well supplied with small streams, many of them with log-driving capacity and with mill privileges." As well, it was observed in 1881 that "there is no prairie in the whole county; it is solid forest..." Indeed, the Black River flowage, which passes through Taylor County, produced 40,000,000 feet of lumber in 1856-1857, a number that jumped to 300,000,000 by 1871-1872. The lumber industry prospered throughout the remainder of the century, after which the lumbermen abandoned the region and its dwindling supplies, and moved to the northwest. A vast cut-over area was one of the legacies the lumbermen left northern Wisconsin. Aspiring agriculturalists were next attracted to the region, and soon, farms began to dot the landscape. Of the county's 625,973 acres, only 65,608 were devoted to farming in 1890. But by 1910, there were 1,582 farms utilizing 136,451 acres, and in 1930, there were 2,464 farms occupying 246,665 acres.⁴

The Sawyer Avenue Road Bridge evolved within this general historical context to provide access across the Black River in the Town of Hammel.

TRUSS BRIDGES IN WISCONSIN

The two most commonly found types of truss bridges are the Pratt and Warren.

³Ibid.

⁴*History of Northern Wisconsin* (Chicago: Western Historical Company, 1881), 1022-1032; Frederick Merk, *Economic History of Wisconsin During the Civil War Decade* (Madison: State Historical Society of Wisconsin, 1916; 2nd ed., 1971), 64-66; Robert Fries, *Empire in Pine: The Story of Lumbering in Wisconsin 1830-1900* (Madison: State Historical Society of Wisconsin, 1951); *State of Wisconsin: 1995-1996 Blue Book* (Madison: State of Wisconsin, 1995), 675; *A Century of Wisconsin Agriculture, 1848-1948* (Madison: Wisconsin Crop and Livestock Reporting Service, 1948), 87.

These two classifications are further subdivided into pony or low trusses, overhead or through trusses and deck trusses. The Warren truss, which two British engineers patented in 1840, placed nominal stress on the vertical members, while the diagonals served as both tension and compression members. Caleb and Thomas Pratt patented the Pratt truss in 1844, incorporating vertical compression members and diagonal tension members. During the nineteenth century, the Pratt truss seemed to be more popular because it used less iron and was easier to erect. In the 1870s, numerous variations in the Pratt design were introduced for long-span bridges. To save money and material, engineers "bent" the top chord into a polygonal configuration, thereby creating a Parker truss. If the top chord had exactly five sides, it was called a "camelback" truss. The increased live loads of railroad locomotives and rolling stock necessitated further design innovations. The addition of subtrusses and/or subties greatly fortified truss bridges and transformed a Pratt into a Baltimore and a Parker into a Pennsylvania truss--the latter considered a "major advance in strengthening the Pratt truss." Another development which sparked much debate around the turn-of-the-century involved the merits of pin connections versus riveted connections for main truss members. Proponents of riveted bridges cited the advantages of increased structural rigidity and the reduction of damaging vibrations; advocates of pin-connected bridges emphasized the theoretically correct stress distribution and the smaller amount of required metal. Although no dramatic resolution occurred, a compromise of sorts was reached in the early twentieth century. Riveted bridges were designed with less duplication of members, and pin-connected bridges, suitably detailed, were still accepted for long-span highway bridges.⁵

These developments affected Wisconsin bridge construction, but other circumstances were equally important. Until the latter nineteenth century, individual bridge companies were largely responsible for bridge design. Consequently, there was little-- if any--standardization of design, although Pratt truss bridges seemed to predominate. Indeed, the state's oldest truss bridge, the 1877 White River Bridge in Burlington, is a Pratt. The Good Roads Movement of the late 1890s and early 1900s, however, prompted a dramatic shift regarding bridge design by promoting greater involvement on the part of local officials and, especially, the state government. In 1907, the state legislature established a Highway Division with the Wisconsin Geological and Natural History Survey to conduct experiments in road design and to provide professional advice to local governments about specific projects.⁶

⁵Jeffrey Hess, Robert M. Frame, III, Robert S. Newbery and John N. Vogel, "Bowen Mill Bridge," *Historic American Engineering Record (HAER) Report*, HAER No. WI-67 (1992): 3-5. On file at the Library of Congress, Washington, D.C.

⁶*Ibid.*, 5-6.

The following year, Wisconsin voters overwhelmingly removed the greatest obstacle to creating a progressive statewide system of bridge and highway construction by eliminating the state's constitutional prohibition against direct state aid to transportation projects. In 1911, the legislature made its first appropriation for highway improvements. In addition, it transformed the Highway Division into an autonomous State Highway Commission (SHC), responsible for overseeing the expenditure of state funds for the development of a state highway network.⁷

The SHC emphasized the use of standardized plans for various types of bridges and culverts. Prior to this time, metal truss bridges dominated crossings of all lengths. After 1911, however, the SHC promoted the construction of girder, beam or slab spans of steel and/or concrete for short crossings (less than thirty-five feet). The SHC particularly favored concrete spans, citing the advantages of lower cost, greater compatibility with aesthetic treatment and greater adaptability to remodeling, especially in terms of roadway widening. Despite its predilection for concrete bridges, the SHC continued to design truss bridges for spans of thirty-six feet or more. The riveted Warren became the state's standard pony design. Indeed, this design became the state's most common type of highway truss bridge. Of the approximately 450 Warren trusses in the state in 1980, over four-fifths were riveted pony trusses built according to SHC standard plans. The SHC also drafted a standard plan for riveted, overhead Pratt trusses. In the first three and one-half years of its work, the SHC designed over fifteen hundred bridges of all types. Practically all the local bridges in the state during these years were either designed by the SHC or were based on SHC standard plans. The SHC continuously revised its truss designs, drawing upon the latest engineering information. In the 1930s, the SHC made a major commitment to keep its standardized plans up to date by dropping the Pratt design in favor of the Warren for all overhead truss configurations. Although concrete designs eventually dominated bridge construction, metal truss bridges remained cost-effective in many situations. Consequently, the SHC continued to design truss bridges until well after World War II.⁸

The number of highway truss bridges in Wisconsin has dwindled substantially over the years. Under the sponsorship of the State Historic Preservation Office (SHPO) of the State Historical Society, George Danko initiated the first systematic study of Wisconsin truss bridges in 1976. By 1980, when WisDOT established the Historic Bridge Advisory Committee (HBAC), seventeen bridges had been listed or found eligible for listing on the National Register of Historic Places. The HBAC pursued

⁷Ibid., 7.

⁸Ibid., 7-8.

the statewide inventory of truss bridges, which then accounted for approximately one-tenth of the state's 10,386 surviving highway bridges built before 1950.⁹

The HBAC identified an initial pool of 996 pre-1941 truss bridges that represented seventeen structural types. The HBAC screened this pool to identify the following for each truss type: those bridges which had the earliest known construction dates; those in the best condition; bridges with the best available historical data; and those with the most noteworthy features. Also considering bridges in park settings, this winnowing process reduced the initial pool to 247. The most significant bridges within each truss category were determined by applying criteria--modified as necessary--that were developed in a Virginia study. The evaluation process yielded a final group of fifty-three bridges deemed potentially eligible for the National Register. Historians Jeffrey A. Hess and Robert M. Frame, III, contracted to complete a field survey and compile historical data for those bridges in 1986. The final survey totaled fifty-four bridges, including two already listed on the National Register (P-18-720 and P-53-162).¹⁰

THE SAWYER AVENUE BRIDGE

Apparently, no bridge existed across the Black River in Section 30 of the Town of Hammel prior to 1880. That year, the Wisconsin State Legislature authorized A.E. Sawyer, David Austin and Richard Dewhurst to erect a dam across the river in that section for the purpose of impounding water and driving logs. To facilitate a river crossing, the Sawyer-Austin Lumber Company "offered to maintain a driveway on said dam and allow the public to use the same to travel over, if said Town of Hammel would construct a road on the quarter line where said dam was located." A public road that connected to the private "bridge" was subsequently built in 1887. Sawyer-Austin maintained the dam through its period of ownership, as did the Joseph Gibson Lumber Company and Ole Barton, the dam's next owners.¹¹

The structure washed out in a June 1905 flood, immediately after which local residents wanted the crossing rebuilt. But a conflict arose as the town was apparently reluctant to build a publicly owned bridge where a privately owned facility had been. After an extensive review, the county decided that the structure lost in the flood was essentially used as a public bridge since the town had built roads up to it.

⁹Ibid., 8-9.

¹⁰Ibid., 9-10.

¹¹*The Laws of Wisconsin Passed at the Annual Session of the Legislature of 1880* (Madison: State of Wisconsin, 1880), 72; Taylor County, *Proceedings*, 513-14, 562.

Consequently, a new bridge was to be built at public expense.¹²

As plans for the new bridge evolved, it became clear that to build in the same location would cost about \$5,000. By slightly shifting the location of the road, the projected cost was reduced substantially. Bids were received from the Clinton Bridge and Iron Works, J.L. Bickels & Co. and the Hennepin Bridge Company. The latter submitted the lowest bid, which was \$3,340.¹³

The Hennepin Bridge Company was established in 1900 by Lawrence H. Johnson, a German immigrant who was born in 1862 and came to the United States in 1875. With intermediate stops in Augusta, New York, and Durand, Michigan, Johnson settled in 1883 in Minneapolis, where he went to work for the Minneapolis Bridge Company. He spent five years with that firm, after which he worked for two other bridge-building businesses. One of those firms was the Wisconsin Bridge and Iron Company, where he worked from approximately 1894-1897. Creating the Hennepin Bridge Company in 1900, Johnson secured several substantial commissions. His firm, for instance, built the Hastings, Minnesota bridge across the Mississippi River, as well as a bridge across the Yellowstone River in Montana. As well, although few specific examples of Hennepin Bridge Company bridges in Wisconsin are known, *Cultural Resource Management in Wisconsin* identifies the firm as a "known prolific out-of-state builder [of Wisconsin bridges]." In addition to operating his bridge-building company, Johnson was elected to the Minnesota state legislature in 1901, where he served as speaker of the house in 1907.¹⁴

¹²Ibid., 513-16, 519-21, 562.

¹³Ibid., 562-64. Also reviewed for this discussion were county plat maps, the most useful of which include the following: *Map of Taylor County* (Medford, WI: C. Paetzold and Koehler Land Co., 1911[?]); *Map of Taylor County and Part of Lincoln Co., Wis.* (Wisconsin Central Railroad Company, 1898); *Map of Taylor County, Wisconsin* (Milwaukee: Frederick C. Bogk, 1888[?]). There appears to be no particular historical significance associated with the specific Black River crossing in Section 30, other than the fact that it was a convenient site at which to cross the river since a dam wide enough to permit travel was already there. It can be surmised that those initially traveling on the new public road and the private dam/bridge were probably associated with the lumber industry, while subsequent travelers may have been those who settled in the cut-over and used the structure as a way to gain access to Medford, about ten miles to the east. It is interesting to note that the county records identify many new bridges that were built in the first few years of the twentieth century. That period of bridge construction, and the erection of the Sawyer Avenue Bridge during that time, may have been part of a larger effort to make all regions of the county accessible, and thus promote settlement in the Taylor County cut-over. *It should be noted that the Town of Hammel Clerk was consulted, as were the Medford Public Library and the Taylor County Historical Society, as efforts were made to locate information for this project. These sources had no (relevant) information to offer.*

¹⁴Albert Marquis, ed., *The Book of Minnesotans: A Biographical Dictionary of Living Men of the State of Minnesota* (Chicago: A.N. Marquis & Co., 1907), 265; Patricia Harpole to Robert S. Newbery, correspondence dated 5 June 1981, copy in possession of Heritage Research, Ltd., Menomonee Falls, WI.

The acceptance of Hennepin's proposal, in addition to fees for the superintending construction, surveying and other costs, brought the total amount for the project to \$3,426.82. The bridge was formally accepted by the county in 1906.

PART II. ARCHITECTURAL INFORMATION

A. General Statement:

1. Architectural character: The Sawyer Avenue Bridge was built in 1905-1906. It is a two-span, Pratt Standard pony truss. Each span contains five panels.
2. Condition of fabric: The historical fabric of this bridge appears to be reasonably good, although the northern hip vertical at the east end of the structure has been replaced, while one of the two diagonals associated with that vertical's top chord connection is loose and (very likely) serving no functional purpose.

B. Description:

With two spans, each of which is 75 feet 10 inches long, as well as east and west approaches that are 7 feet 8 inches and 14 feet 4 inches long, respectively, the overall length of Sawyer Avenue Bridge is 173 feet 8 inches. The width of its single-lane traffic deck is 16 feet. The bridge rests upon six steel cylinders, the diameters of which are approximately 3 feet. Steel plates are set between, and welded to, the mid-river cylinders in such a fashion that a solid wall is created. The approaches extend from the shoreline cylinder pairs to concrete abutments anchored in the river embankment. The deck of each span is carried by four, 15 inch by 5 1/2 inch, rolled "I" beams. (Note that a 12 inch by 5 inch, rolled "I" beam is also utilized at each pair of tubes.) Perpendicular to the floor beams are six stringers. The two outer stringers are 6 inch by 1 3/4 inch channels, while those in between are rolled, 6 inch by 3 1/4 inch "I" beams. The bottom lateral bracing is comprised of 1 inch rods that are threaded and bolted. The deck itself is built of 4 inch-thick timbers and has a macadam overlay.

Floor beams are hung from 12 inch by 5 1/2 inch hip and intermediate verticals, each of which is fabricated from 2 inch by 2 1/4 inch angles, back-to-back with lacing. The inclined endposts and top chords are 12 inches by 6 inches. Each is fabricated from 6 inch channels with coverplates and lacing. Diagonal member dimensions vary with each panel. Those in panels two and four (counted from east to west)

consist of paired, 1 inch square bars, while those in panel three are paired, 7/8 inch rods with screwbuckles. Bottom chords are paired, rectangular eyebars that also vary with the panel. Those in panels one, two, four and five are 2 inch by 3/4 inch bars, and those in panel three are 3 inch by 3/4 inch bars.

All major connections are pinned.

The bridge has no ornamentation. It does, nevertheless, have a two-course railing comprised of 2 inch angles on each side of the traffic deck. The top course is 41 inches above the deck.

C. Setting:

The bridge is located in the Town of Hammel, at that point where Sawyer Avenue crosses the Black River. The area around the bridge is all rural. It includes some open fields, wooded areas and a few houses. The Chequamegon National Forest boundary is several hundred feet west of the bridge, the latter being oriented on a northwest/southeast axis.

PART III. SOURCES OF INFORMATION

A. Bibliography:

1. Primary or unpublished sources:

Harpole, Patricia. Correspondence to Robert S. Newbery, 5 June 1981. Copy in possession of Heritage Research, Ltd., Menomonee Falls, WI.

The Laws of Wisconsin Passed at the Annual Session of the Legislature of 1880. Madison: State of Wisconsin, 1880.

Map of Taylor County. Medford, WI: C. Paetzold and Koehler Land Co., 1911 (?).

Map of Taylor County and Part of Lincoln Co., Wis. Wisconsin Central Railroad Company, 1898.

Map of Taylor County, Wisconsin. Milwaukee: Frederick C. Bogk, 1888(?).

Taylor County. *Record of Proceedings*. Volume D. Records on file at the County Clerk Office, Taylor County Courthouse, Medford, WI.

2. Secondary and published sources:

A Century of Wisconsin Agriculture, 1848-1948. Madison: Wisconsin Crop and Livestock Reporting Service, 1948.

Fries, Robert. *Empire in Pine: The Story of Lumbering in Wisconsin 1830-1900*. Madison: State Historical Society of Wisconsin, 1951.

Hess, Jeffrey, Robert M. Frame, III, Robert S. Newbery and John N. Vogel. "Bowen Mill Bridge." Historic American Engineering Report, HAER No. WI-67 (1992). On file at the Library of Congress, Washington, D.C.

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Wyatt, Barbara, ed. *Cultural Resource Management in Wisconsin*. Vol. 2. Madison: State Historical Society of Wisconsin, Historic Preservation Division, 1986.

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30 April 1997

PART IV. PROJECT INFORMATION

This project has been sponsored by the Wisconsin Department of Transportation. Short, Elliot, Hendrickson, consulting engineers in Chippewa Falls, Wisconsin, formally acted as the contracting agency. The project was directed by Dr. John N. Vogel, Principal Investigator and Sr. Historian for Heritage Research, Ltd. (HRL), who provided the photographic documentation and the architectural/technical data. He also edited and prepared the final document. The general truss bridge context, as well as the information on Hennepin Bridge Company, was originally prepared by Jeffrey Hess, Robert Frame, III, and Robert Newbery in a report for the Wisconsin Department of Transportation. That context was edited and summarized by Dr. Kevin Abing, who also compiled the local contextual information. David J. Vogel assisted during the photographic activities associated with this project.

